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The Impact of COVID'19 Widespread on the Performance of Socially Responsible Companies and Blue Chip Companies - A Comparative Analysis

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Abstract

The paper attempts to answer an interesting question of whether green and socially responsible companies are well rewarded in terms of better price discovery and higher returns in the Indian stock market during the COVID'19 pandemic. The paper makes use of a semi-log regression equation, Paired Samples t-test and various risk-adjusted techniques of performance evaluation to achieve the objectives of the study. We find that the impact of COVID'19 was positive and significant for green and socially responsible companies. Further, these companies outperformed their counterparts by showing better price discovery, significantly higher returns and risk premiums using various risk-adjusted measures. Our findings have paved the way for green investing or socially responsible investing in India and are relevant for banks, mutual fund or portfolio managers, policymakers and investors. Offering green or socially conscious products like Green Fixed Deposit Options, Clean Technology Ventures, etc., should become a priority for banks and mutual funds. Regulators and policymakers should ensure that environmentally friendly and socially conscious businesses receive enough funding for the best possible use while causing the least amount of environmental damage. Since the securities of these companies are performing well during the pandemic period, there is a distinct possibility that investors are putting more faith in these companies.

Keywords: Green Companies, Socially Responsible Companies, Semi-Log Regression, GREENEX, ESG Index, Fama's Decomposition Measure

Introduction

Growing awareness of environmental, social, governance and ethical issues is changing the perceptions and attitudes of today's investors. This development is fuelling retail and institutional investors' decisions towards socially responsible investing (SRI). The concept of SRI is an emerging concept in investment management which requires the investor to pay adequate attention to the companies' non-financial or environmental, social and governance performance besides the classical financial performance while deciding about investment. In classical finance, investment decisions were solely based on monetary rewards while this modern concept of SRI has gained momentum in the wake of growing importance of corporate responsibility (CR) which includes environmental, social and governance concerns. There are various reasons for wide recognition of the concept of CR like global financial crisis, global warming, environmental degradation, major corporate frauds, failure on the part of major businesses to address social and ethical concerns, and very recently COVID'19, etc.

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Often blended with socially responsible investing (SRI), green investments are essentially investment activities that are committed to projects or businesses that focus upon the conservation of natural resources, the production and discovery of alternative energy sources, the implementation of clean air and water projects, and/or other environmentally conscious business practises. Green investments may fit under the umbrella of SRI, but is fundamentally much more specific. There isn't a huge difference between socially responsible investing (SRI) and green investing; green investing is a form of socially responsible investing. Both of these terms refer to investment philosophies that are backed by ethical guidelines that help to influence the investment decision process. The biggest difference between the two is the overall scope of the investment philosophies' focus: green investing is narrower in its focus when compared to socially responsible investing.

The term "Green Investment or SRI", despite being omnipotent, can sometimes be vague. When people talk about it, they are speaking generally of investing in activities that, in a popular context, can be considered good for the environment or society in a direct or indirect manner. This style of investing is an offshoot of environmentally conscious investing, however, green investing or SRI is still at a nascent stages of development in our country. In fact, it is the general belief that investing in these companies can give lesser returns than other counterparts. Many companies in this arena are in the development stage, with low revenues and high earnings valuations. In the wake of increasing firm's performance keeping in mind the concern for environment and society, Tripathi and Bhandari (2014) provide an extensive review of literature on the performance of SRI. They find that almost in every study related to performance evaluation; socially responsible companies/funds perform better or at least not inferior to conventional funds or respective benchmarks.

The history of humanity has seen many pandemics on a global scale. The most recent one, COVID'19, which caused several infections and fatalities across the globe, is currently spreading in society. The World Health Organization has classified this virus as a virus of concern due to its severe symptoms and high rate of transmission. Due to the high incidence of uncertainty, the economic crisis brought on by this pandemic differs from the Financial Crisis of 2007 and the Great Depression of 1930. Governments took a number of actions to safeguard public health and maintain a stable economy. The movement restriction measures and global economic uncertainty were the main causes of the economic repercussions of COVID'19 in practically every country. The COVID'19 epidemic had a negative impact on stock markets in the majority of the countries.

This paper tries to investigate the impact of COVID'19 on Indian Stock market. The paper aims to analyse an interesting question as to whether stocks of green companies or socially responsible companies outperform those of blue chip companies in the pandemic period. The key objectives of the paper are:

- To examine the growth rate of Green Index, Socially Responsible Index and Blue Chip Index.
- To study the behaviour of these indices on account of pandemic and other periods.
- To study whether return differs significantly across these indices in different periods.
- To evaluate the performance of these indices using various risk adjusted techniques.

The Efficient Market Hypothesis (EMH) refers to the notion that market prices fully reflect all available information. A market in which prices always fully reflect available information is called efficient. We have assumed that markets are efficient, so an efficient market would discount financial as well as non–financial information. Also, if markets are efficient, there is correspondence between price discovery and returns. Fama (1970) stressed the equivalence between price discovery and expected returns. As the expected price is directly proportional to the expected return [i.e. Expected price at tn+1= (1+ Expected Profit at tn+1) x Price at tn], it can be logically concluded that both price discovery and returns move in tandem. If markets are efficiently discounting all available information and if investors have become more informed towards the environmental or social responsibility of companies, then it could be reasonably expected that both price discovery as well as returns would be better in the case of green and socially responsible companies than blue chip companies, especially during the pandemic period.

The remainder of this paper is organized as follows. Section 2 provides a brief review of the literature regarding the performance of green and socially

responsible companies or indices. Section 3 describes the data and methodology of the research work. Section 4 provides the empirical evidence and discussion of results, while Section 5 concludes the research. It concludes that environment, social responsibility and governance have got a positive influence on the stock market, and hence, green and socially responsible companies could be a safer bet for Indian investors during the pandemic period.

Review of Literature

Tripathi and Bhandari (2012) tried to examine whether there is a significant difference in the returns of various green and non-green stocks portfolios and found that the green, blue chip stocks portfolio generated significantly higher returns than market returns implying that green investing was more rewarding during the crisis period. They also showed that the performance of the green stocks portfolio was better than the non-greens stocks portfolio, and green stocks could be a safer bet for conservative investors during times of economic and financial crisis.

Bhanumurthy et al. (2014) checked whether the price discovery and returns of socially responsible companies are higher than general companies or not. They found that both price discovery and returns of socially responsible companies were significantly better than general companies during and post-crisis periods.

Tripathi and Bhandari (2015a) have examined the performance of socially responsible stocks portfolios and general stocks portfolios over different business economic conditions. They found that socially responsible portfolios generated significantly higher returns than general portfolios and outperformed them using single-factor alpha and multi-factor alpha. Their findings support the view that socially responsible investing is a boon for investors in India.

Tripathi and Bhandari (2015b) examined whether the companies that are socially responsible are performing better than general companies in the Indian stock market in terms of price discovery, return, risk and various risk-adjusted measures during different structural break periods (i.e. pre-crisis, crisis and post-crisis). Their findings supported the view that socially responsible investing (SRI) was a boon for Indian investors during the crisis period. We find that the growth rate of the socially responsible index is significantly better than the general index during the crisis period. Despite having higher risk, the socially responsible index generated a significantly higher return than the general index and hence outperformed all other indices on the basis of all risk-adjusted measures employed during the crisis period.

Contessi and De Pace (2020) reported that the stock markets of 18 major countries collapsed during the first wave of COVID'19. They also find statistical evidences of instability transmission from the Chinese stock market to all other markets. Ozili and Arun (2020) showed that when the pandemic started, i.e. in the week of 24 February 2020, the largest 10 companies in the USA lost a good amount of money from their accounts. Further, Fernandes (2020) showed that the stock market has fallen below 30% from its peak during March 2020. Besides the USA, Fernandes (2020) also studied the other major economies of the world and indicated that the stock market performances of the UK, Germany, Brazil and Columbia were even worse than the performance in USA stock market, with a fall of 37%, 33%, 48% and 47% respectively.

Alber et al. (2020) reported that the stock market for China, France, Germany and Spain had been impacted more by new cases of COVID'19 than by deaths in the period from 1 March 2020 – 10 April 2020. Al-Awadhi et al. (2020) considered the impact of a pandemic on the two broad market indices of China, i.e. Hang Seng Index and the Shanghai Stock Exchange Composite Index, over the period 10 January 2020 – 16 March 2020 and found that both the indices were significantly negatively related to total new cases as well as total new deaths caused by the COVID'19. Similarly, Elsayed and Abdelrhim (2020) investigated the impact of new cases and deaths due to COVID'19 over the period 1 March 2020 – 10 May 2020 on 17 different sectors of the Egyptian stock market. Their results reported that the majority of sectors were more sensitive to cumulative mortality than to daily deaths.

Ozili and Arun (2020) also studied the impact of social distancing policies on the leading stock markets of Japan, the UK, the USA and South Africa. They showed that from 23 March 2020 – 23 April 2020, the number of lockdown days and international travel restrictions impacted the stock market negatively. Similarly, Chowdhury et al. (2021) used the same approach in some countries in Europe and found that number of lockdown days, new cases of COVID'19 and travel restrictions affected the stock market in a negative way.

Kartal et al. (2020) studied the reaction of main stock market indices of East Asian Countries (i.e. China, Mongolia, Japan, Hong Kong, Korea and Taiwan) to COVID'19. Their results showed the negative effect of the pandemic on the stock markets taken. Hatmanu and Cautisanu (2021) investigated the impact of COVID'19 on the Romanian stock market. For that, they considered the impact on Bucharest Exchange Trading (BET). Their results showed a significant long-term impact of the pandemic on the BET Index for Romania, while the European economic context had a positive influence.

Zoungrana et al. (2021) empirically tested the stock returns of companies listed on the West African Economic and Monetary Union's stock market during the COVID'19 pandemic. They reported that social distancing and governance measures had a positive influence on the stock market, whereas movement restrictions and lockdown measures impacted the stock value in a negative way.

Data and Methodology

The study evaluates three types of index viz. GREENEX Index (an index of green companies), ESG Index (an index of socially responsible companies), and SENSEX and NIFTY (an index of blue chip companies) from the Indian stock market. GREENEX and ESG represent an index of environmentally responsible companies. To debunk the above-mentioned misconception regarding the performance of green and socially responsible companies, we have performed a comparative statistical analysis of environmentally responsible companies and blue chip companies. Proxy for the market is represented by CNX500 Equity Index. The implicit yield on 91 days T-bills have been taken as a proxy for the risk-free rate of return. To accomplish our objectives, the following hypotheses have been tested:

- Efficiency of price discovery is same for all the indices.
- There is no significant impact of pandemic on the growth of indices.
- There is no significant difference in the returns of different indices in various periods.
- Performance of GREENEX and ESG Index is similar to the performance of SENSEX and NIFTY using various risk adjusted measures.

We have considered the weekly data from 1 January 2019 – 31 August 2022. We have selected the period from 2019 onwards as the market for socially responsible companies, and green companies have become more developed and efficient during this period. We have collected weekly closing index values of all four indices for above said period from the Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) websites. These values are converted into simple percentage returns as (Pt – Pt-1)/Pt-1. We are interested in finding out the growth rate of different indices taken in the paper, and for that, we have estimated the following growth equation in respect of all four indices.

$$L_n\ (Index\ Value) = \beta_0 + \beta_1 T \qquad (1)$$

Where, L_n = Natural Log of i^{th} Index Value

β_0 = Intercept of i^{th} Index Value

β_1 = Growth Rate of i^{th} Index Value

T = Time Period

i covers four indices namely GREENEX, ESG, SENSEX and NIFTY.

During this period, we could also identify three breaks occurring in the global market and Indian market. These breaks are on account of COVID'19. We have taken the period for the pandemic on the basis of lockdowns and COVID waves in a country. The pandemic period includes the period of the first and second waves in a country. Thereafter, restrictions were relaxed, so we considered that period a post pandemic. These breaks are as follows:

1 January, 2019 – 17 March, 2020 – Pre Pandemic Period

24 March, 2020 – 29 June, 2021 – Pandemic Period

6 July, 2021 – 31 August, 2022 – Post Pandemic Period

We are interested in knowing the fact that how these indices perform during these periods. To check if there is a significant difference in the growth rates of different indices during the above-identified periods, we have estimated the following growth equation using dummies for the breaks.

$$L_n\ (Index\ Value) = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 T + \beta_4 TD_1 + \beta_5 TD_2 \qquad (2)$$

Where, L_n = Natural Log of i^{th} Index Value

$D_1 = 0$ and $D_2 = 0$ for Pre Pandemic Period

$D_1 = 1$ and $D_2 = 0$ for Pandemic Period

$D_1 = 0$ and $D_2 = 1$ for Post Pandemic Period

β_0 = Intercept of i^{th} Index Value in Pre Pandemic Period

$\beta_0 + \beta_1$ = Intercept of i^{th} Index Value in Pandemic Period

$\beta_0 + \beta_2$ = Intercept of i^{th} Index Value in Post Pandemic Period

β_3 = Growth Rate of i^{th} Index Value in Pre Pandemic Period

$\beta_3 + \beta_4$ = Growth Rate of i^{th} Index Value in Pandemic Period

$\beta_3 + \beta_5$ = Growth Rate of i^{th} Index Value in Post Pandemic Period

Paired Samples T-Test

In order to make a comparative analysis of returns of green companies, socially responsible companies and general companies, we have used Paired Samples T-Test. In applying the t-test, we shall compare the returns for the overall period and the break periods of all the indices taken.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where, $\bar{x}_1$ and $\bar{x}_2$ are the returns of two indices.

S_1 and S_2 are the standard deviations of two indices.

n_1 and n_2 are the sizes of two indices.

Risk and Risk Adjusted Measures for Performance Evaluation

- *Standard Deviation:* In finance, the standard deviation is often used to measure the absolute risk associated with fluctuations in the price of a given asset. Risk is an important factor in determining the variation in returns of various portfolios. Thus, the investment decision of an investor should not solely depend upon return but also on the risk of investment.

$$\text{Standard Deviation} = \sqrt{\sum_{i=1}^{n} \frac{(X_i - \overline{X})^2}{n-1}}$$

- *Coefficient of Variation:* As we know that standard deviation is the measure of absolute risk, so for taking better investment decisions relative measure of risk is there, known as the coefficient of variation. It shows the risk per unit of return, which provides more meaningful results when the returns of portfolios are not the same. It can be calculated as:

$$\text{Coefficient of Variation} = \frac{\sigma_P}{AR_P}$$

- *Beta:* It shows the sensitivity of the portfolio's return with respect to the market return. A beta below 1 indicates that the portfolio has lower volatility than the market or is not highly correlated with the market. However, a beta of above 1 signifies the volatility of the portfolio, and it tends to move in the same direction of the market. We have calculated the beta of the portfolio by using the market model:

$$R_P - R_F = \alpha + \beta (R_M - R_F)$$

- *Systematic Risk*: Systematic risk is attributable to broad macro factors affecting all securities and hence cannot be eliminated or reduced with diversification. It can be calculated as:

$$\text{Systematic Risk} = \sqrt{\beta^2 \times {\sigma_M}^2}$$

- *Unsystematic Risk:* Unsystematic risk is attributable to factors unique to a particular security or company. It can be reduced to a very small amount or even zero with the benefit of diversification. For well-diversified portfolios, unsystematic risk is very small or equal to zero. It can be calculated as:

$$\text{Unsystematic Risk} = \sqrt{{\sigma_P}^2 - \beta^2 {\sigma_M}^2}$$

- *Sharpe Ratio:* This ratio measures the return of the portfolio (ARP) in excess of risk-free (RF), compared to the total risk of the portfolio. Since it uses standard deviation as a measure of risk, it does not assume that the portfolio is well diversified. In effect, the portfolio standardizes the returns in excess of the risk-free rate by the variability of the return. It is also termed the Reward to Variability ratio. If ARP is the average monthly portfolio return, RF is the monthly risk-free return, and the P portfolio is a total risk, then the Sharpe ratio can be calculated as:

$$\text{Sharpe ratio} = \frac{AR_P - R_F}{\sigma_P}$$

- *Treynor Ratio:* This ratio measures the relationship between the return of the portfolio, above the risk-free rate, and its systematic risk indicated by portfolio beta (βP). In effect, it standardizes the returns in excess of the risk-free rate by the volatility of the

return. This ratio is particularly relevant for evaluating the performance of the well-diversified portfolio since it only takes systematic risk into account.

$$\text{Treynor ratio} = \frac{AR_P - R_F}{\beta_P}$$

- *Modified Sharpe Ratio:* Israelsen (2005) argued that the Sharpe ratio may lead to spurious ranking when excess returns of portfolios are negative. He proposes to correct this anomaly by modifying the standard Sharpe ratio by introducing an exponent to the denominator of the Sharpe ratio. It can be calculated as:

$$\text{Modified Sharpe Ratio} = \frac{AR_P - R_F}{\sigma_p^{[(AR_P - R_F)/|(AR_P - R_F)|]}}$$

- *Jensen's Alpha:* It is used to determine the abnormal return (α) of a security or portfolio of securities over the theoretical expected return. The theoretical return is predicted by a market model. A portfolio with a consistently positive excess return (adjusted for risk) will have a positive alpha and vice-versa. It can be calculated as:

$$\alpha = R_P - [R_F + (R_M - R_F)\,\beta_P]$$

- *Information Ratio:* This ratio allows us to check that the risk taken by the manager in deviating from the benchmark is sufficiently rewarded. It is defined as the residual return of the portfolio divided by tracking error, where the residual return is the difference between the return of the portfolio and the return of a selected benchmark index, and the tracking error is the standard deviation of residual return. It can be calculated as:

$$\text{Information Ratio} = \frac{E[R_P - R_B]}{\sigma_{ep}}$$

- *Fama's Decomposition Measure:* The distinct feature of this paper is the use of Fama's Decomposition Measure in the portfolio's performance evaluation. Fama developed a methodology for evaluating the investment performance of managed portfolios. Fama decomposed the alpha produced by the CAPM model into non-diversification, net selectivity and diversification. In terms of Fama's framework, a portfolio's excess return constitutes the following three main components:

- Compensation for non-diversification (Systematic Risk) = βp (RM – RF)
- Compensation for diversification (Unsystematic Risk) = (RM - RF) [(σP/σM) – βP]
- Net selectivity = (RP – RF) – (σP/σM) (RM - RF) = Selectivity – Compensation for unsystematic risk

Data Analysis and Results

Table 1: Value of Intercept and Growth Rate for Various Indices

Parameters (Equation 1)	*GREENEX*	*ESG*	*SENSEX*	*NIFTY*
Constant (β_0)	7.728***	5.016***	10.402***	9.186***
T (β_1)	0.004***	0.004***	0.003***	0.003***
R^2	0.739	0.730	0.693	0.675

***Significant at 1%.

Table 2: Paired Samples T-Test Result

Pairs	*Mean Difference (%)*	*T-Value*	*Degrees of Freedom*	*P-Value*
Return GREENEX – Return Sensex	0.0219	0.199	178	0.842
Return GREENEX – Return NIFTY	0.0269	0.269	178	0.788
Return ESG – Return SENSEX	0.0289	0.922	178	0.358
Return ESG – Return NIFTY	0.0338	1.464	178	0.145

The coefficient of determination (R2) is better in the case of GREENEX (0.739) and ESG (0.730) as compared to SENSEX (0.693) and NIFTY (0.675). This indicates that growth in GREENEX and ESG Index is adequately captured by the time period under consideration. Since all the intercept values are significant at 1% (see Table 1), it implies that there are some other factors besides the time period which have a significant effect on the growth rate. The growth rate for GREENEX and ESG Index is 0.4% per week which is higher than the growth rate of SENSEX and NIFTY of 0.3% per week. All the growth rates are significant at a 1% level of significance (see Table 1).

Table 2 shows the comparative analysis of returns of various indices for the overall period. Even though the returns of GREENEX and ESG Index are higher in comparison to SENSEX and NIFTY, the difference is not statistically significant. This clearly shows that environmentally responsible companies (green and socially responsible) are outperforming blue chip companies in the Indian stock market. Thus, investors have become more sensitised towards social responsibility, sustainable development and other non-financial information. Since there is equivalence in return and prices, the arguments of Fama (1970) holds true. Finance and investment are not in any way exempt from this shift in the public's attitude toward the environment and sustainable development, which is spreading like wildfire throughout all aspects of human activity. Business, or society as a whole, exists primarily for the benefit of the masses, but it must do so sustainably and adapt to its changing environment in order to survive. Everyone has become more aware of the need to safeguard the environment and follow a path of sustainable development as a result of this change in attitude and belief. As a result, we may conclude that businesses that practice environmental responsibility get benefits in the form of improved growth rates and higher profits.

Table 3: Value of Intercept and Growth Rate for Various Indices during Pre-Pandemic, Pandemic and Post-Pandemic Period

Parameters (Equation 2)	*GREENEX*	*ESG*	*SENSEX*	*NIFTY*
Constant (β_0)	7.910***	5.165***	10.518***	9.319***
D1 (β_1)	-0.901***	-0.875***	-0.788***	-0.841***
D2 (β_2)	0.250***	0.417***	0.394***	0.376***
Time (β_3)	-0.000033***	0.00076**	0.00125***	0.00079**
Time*D1 (β_4)	0.0104***	0.0096***	0.0080***	0.0088***
Time*D2 (β_5)	0.0016***	0.0000	-0.0009*	-0.0004

***Significant at 1% **Significant at 5% *Significant at 10%.

Analysis for Pre-Pandemic Period

Table 4: Value of Intercept and Growth Rate for Various Indices

Parameters	*GREENEX*	*ESG*	*SENSEX*	*NIFTY*
Intercept	7.910***	5.165***	10.518***	9.319***
Growth Rate	-0.000033***	0.00076**	0.00125***	0.00079**

***Significant at 1% **Significant at 5%.

Table 5: Paired Samples T-Test Result

Pairs	*Mean Difference (%)*	*T-Value*	*Degrees of Freedom*	*P-Value*
Return GREENEX – Return Sensex	-0.1055	-0.955	63	0.343
Return GREENEX – Return NIFTY	-0.0665	-0.643	63	0.523
Return ESG – Return SENSEX	-0.0398	-0.935	63	0.354
Return ESG – Return NIFTY	-0.0007	-0.021	63	0.983

During the pre-pandemic period (i.e. from 1 January 2019 – 17 March 2020), the growth rate of GREENEX (-0.003% per week) and ESG (0.076% per week) is less than that of SENSEX (0.125% per week) and NIFTY (0.079% per week). Looking at the results of Paired Samples t-test, the returns of GREENEX and ESG Index are lower than the Index of blue chip companies (i.e. SENSEX and NIFTY). Still, the difference is not statistically significant (see Table 5). The results suggest that price discovery is better in the case of blue chip companies as compared to environmentally responsible companies. This may be because, during the aforementioned time period, the concepts of sustainability and green investments were still in their infancy and had only recently begun to emerge.

Although at a slow rate, a shift in company philosophy and operations had already begun. Investors were wary of investing in environmentally conscious businesses because there was little to no knowledge about such notions. As a result, the growth rates of the GREENEX and ESG Index are lower than those of the SENSEX and NIFTY. Investors simply responded to the financial aspects of the businesses, rarely giving the company's concepts and ideologies any weight. In this case, the arguments made by Fama (1970) were valid because return and pricing are equivalent.

Analysis of Pandemic Period

Table 6: Value of Intercept and Growth Rate for Various Indices

Parameters	*GREENEX*	*ESG*	*SENSEX*	*NIFTY*
Intercept	7.009***	4.290***	9.730***	8.478***
Growth Rate	0.01037***	0.01036**	0.00925***	0.00959**

***Significant at 1% **Significant at 5%.

Table 7: Paired Samples T-Test Result

Pairs	*Mean Difference (%)*	*T-Value*	*Degrees of Freedom*	*P-Value*
Return GREENEX – Return Sensex	0.1292	0.697	66	0.488
Return GREENEX – Return NIFTY	0.0983	0.612	66	0.543
Return ESG – Return SENSEX	0.1192**	2.087	66	0.041
Return ESG – Return NIFTY	0.0883**	2.155	66	0.035

**Significant at 5%.

The effect of the pandemic is progressive in all four indices, i.e. GREENEX, ESG, SENSEX and NIFTY. The growth rate is positive for all the indices in this period (see Table 6). The growth rate of the GREENEX Index (1.037% per week) and ESG Index (1.036% per week) is higher than that of SENSEX (0.925% per week) and NIFTY (0.959% per week). Also, as per the results of Paired Samples t-test, there is an equivalence between return and prices. During this period, even though the returns of both GREENEX and ESG are higher than the returns of SENSEX and NIFTY, the difference is statistically significant for ESG Index only (see Table 7). Hence, Fama's (1970) arguments hold true. Thus, it suggests that Fama's contentions hold valid during the pandemic also. Therefore, environmentally responsible companies are well rewarded in terms of better prices and higher returns. The findings also support the notion that the public had become weary of investing in businesses as a result of the epidemic and had instead begun to support both bluechip and environmentally friendly businesses. Since environmentally conscious businesses generate larger returns, it follows that their prices will increase faster than those of bluechip corporations during this time. Investors are now more aware of environmental, societal, and governance challenges, and as a result, they are giving environmentally conscious businesses the respect they deserve. Investors have more faith in companies that are environmentally conscious in tough times.

Analysis for Post-Pandemic Period

Table 8: Value of Intercept and Growth Rate for Various Indices

Parameters	*GREENEX*	*ESG*	*SENSEX*	*NIFTY*
Intercept	8.160***	5.582***	10.912***	9.695***
Growth Rate	0.00157***	0.00076**	0.00035***	0.00039**

***Significant at 1% **Significant at 5%.

Table 9: Paired Samples T-Test Result

Pairs	Mean Difference (%)	T-Value	Degrees of Freedom	P-Value
Return GREENEX – Return Sensex	0.0423	0.148	47	0.883
Return GREENEX – Return NIFTY	0.0518	0.194	47	0.847
Return ESG – Return SENSEX	0.0055	0.089	47	0.929
Return ESG – Return NIFTY	0.0039	0.093	47	0.927

During the post-pandemic period, the growth rate of GREENEX (0.157% per week) and ESG Index (0.076% per week) is higher than that of SENSEX (0.035% per week) and NIFTY (0.039% per week). In this period, the differential growth rate is negative for SENSEX and NIFTY both (see Table 3). The result of paired samples t-test shows that environmentally responsible companies are generating higher returns than blue chip companies, but the difference is not statistically significant (see Table 9). Thus, it upholds Fama's arguments that price discovery and returns move in tandem, i.e. price discovery and returns are better in the case of environmentally responsible companies. This shows that after the pandemic, investors have become more focussed towards the environment and society and are giving due regard to environmentally responsible companies.

Awareness has come in society that businesses are not property institutions but are societal institutions whose main aim is to fill the gap in respect of the natural environment and society not covered by the state rather than carrying out economic activities for profit alone. Overall results of the analysis are in line with our expectations since we were expecting the index of environmentally responsible companies to perform at least at par with their counterparts, if not better. Although there is still a long way to go, people are beginning to recognise the ideas of environmental protection, sustainable development, and the green economy. The government is also actively working to raise awareness of these principles. Through our data, we can conclude with certainty that green companies experience higher returns and growth rates than blue chip companies.

Table 10: Return, Risk and Risk-Adjusted Measures of Various Indices

Index	Overall Period	Pre-Pandemic Period	Pandemic Period	Post-Pandemic Period
Average Return (%)				
GREENEX	0.3154	-0.2957	0.9929	0.1846
ESG	0.3223	-0.2300	0.9829	0.1368
SENSEX	0.2934	-0.1902	0.8636	0.1423
NIFTY	0.2885	-0.2292	0.8945	0.1328
Standard Deviation (%)				
GREENEX	2.763	2.677	2.946	2.437
ESG	2.859	2.848	3.168	2.218
SENSEX	2.896	2.841	3.255	2.296
NIFTY	2.864	2.832	3.194	2.252
Coefficient of Variation				
GREENEX	8.761	-9.054	2.967	13.206
ESG	8.872	-12.384	3.224	16.221
SENSEX	9.871	-14.933	3.769	16.133
NIFTY	9.928	-12.354	3.571	16.959
Beta				
GREENEX	0.883	0.915	0.877	0.799
ESG	0.989	1.002	0.994	0.947
SENSEX	0.990	0.996	1.009	0.955
NIFTY	0.989	0.996	1.001	0.953
Systematic Risk (%)				
GREENEX	2.523	2.581	2.759	1.840

Index	*Overall Period*	*Pre-Pandemic Period*	*Pandemic Period*	*Post-Pandemic Period*
ESG	2.826	2.826	3.128	2.181
SENSEX	2.829	2.809	3.175	2.199
NIFTY	2.826	2.809	3.150	2.195
Unsystematic Risk (%)				
GREENEX	1.125	0.712	1.031	1.597
ESG	0.434	0.353	0.506	0.403
SENSEX	0.619	0.418	0.717	0.656
NIFTY	0.462	0.358	0.530	0.503
Sharpe Ratio				
GREENEX	0.0842	-0.1516	0.3150	0.0467
ESG	0.0838	-0.1194	0.2897	0.0298
SENSEX	0.0728	-0.1057	0.2453	0.0312
NIFTY	0.0718	-0.1198	0.2597	0.0276
Treynor Ratio				
GREENEX	0.0026	-0.0044	0.0106	0.0014
ESG	0.0024	-0.0034	0.0092	0.0007
SENSEX	0.0021	-0.0030	0.0079	0.0007
NIFTY	0.0021	-0.0034	0.0083	0.0006
Jensen's Alpha (%)				
GREENEX	0.0468	-0.0659	0.1558	0.0725
ESG	0.0314	0.0321	0.0428	0.0170
SENSEX	0.0023	0.0696	-0.0896	0.0221
NIFTY	-0.0024	0.0306	-0.0520	0.0127
Information Ratio				
GREENEX	0.0415	-0.0926	0.1511	0.0454
ESG	0.0724	0.0909	0.0846	0.0422
SENSEX	0.0036	0.1665	-0.1249	0.0337
NIFTY	-0.0053	0.0854	-0.0975	0.0253
Modified Sharpe Ratio				
GREENEX	0.08424	-0.00011	0.31496	0.04672
ESG	0.08382	-0.00009	0.28969	0.02979
SENSEX	0.07277	-0.00008	0.24536	0.03119
NIFTY	0.07187	-0.00009	0.25971	0.02758

Table 10 shows that index of environmentally responsible companies (GREENEX and ESG) generated a higher return than that of blue chip companies (SENSEX and NIFTY) in all the periods except for the pre-pandemic period. When we consider standard deviation (an absolute measure of risk), it shows that SENSEX and NIFTY are riskier than ESG and GREENEX. Similar results were obtained when we consider the coefficient of variation, a relative measure of risk. GREENEX and ESG had the least coefficients in all the periods, which suggests that they are the most defensive index among all other indices. Higher betas of SENSEX and NIFTY in all the periods recommend that they are more sensitive to market conditions than GREENEX and ESG. Since systematic risk is attributable to macroeconomic factors, it cannot be reduced with diversification. We find that even after broad diversification in SENSEX and NIFTY, they are more risky than GREENEX and ESG in all the periods. And, because of more diversification in SENSEX and NIFTY, the unsystematic risk of SENSEX and NIFTY is lower than ESG and GREENEX in all the periods.

Using various risk-adjusted techniques of performance evaluation, we report that GREENEX and ESG Index outperformed SENSEX and NIFTY in all the periods. The result of the Sharpe Ratio shows that GREENEX

and ESG Index generated the highest return per unit of total risk in comparison to SENSEX and NIFTY in all the periods. Similarly, a high Treynor Ratio of GREENEX and ESG index indicates the highest return per unit of total systematic risk in all the periods. Positive and highest Jensen's alpha of GREENEX and ESG Index during all the periods (especially during the pandemic) signifies that environmentally responsible companies are able to earn the highest abnormal return, but the difference is statistically insignificant. Similarly, a high information ratio of GREENEX and ESG Index compared to SENSEX and NIFTY shows that an investor can achieve higher returns more efficiently by taking on additional risk. Similar results were obtained using the Modified Sharpe Ratio too. GREENEX and ESG Index outperformed SENSEX and NIFTY by producing the highest coefficients of Modified Sharpe Ratio in all the periods. Thus, there is absolutely no penalty if investors invest in environmentally responsible stocks because these stocks had higher returns and outperformed in terms of various risk-adjusted measures (especially during the pandemic period).

Table 11: Results of Fama's Decomposition

Index	*Risk Premium (%)*	*Risk Premium Due to (%)*				*Ranking on the basis of Net Selectivity*
Overall Period		*Systematic Risk*	*Selectivity*	*Unsystematic Risk*	*Net Selectivity*	
GREENEX	0.2328	0.1860	0.0468	0.0177	0.0291	1
ESG	0.2397	0.2083	0.0314	0.0024	0.0289	2
SENSEX	0.2108	0.2085	0.0023	0.0049	-0.0027	3
NIFTY	0.2059	0.2083	-0.0025	0.0028	-0.0052	4
Pre-Pandemic Period						
GREENEX	-0.4058	-0.3399	-0.0659	-0.0127	-0.0532	4
ESG	-0.3401	-0.3722	0.0321	-0.0029	0.0349	2
SENSEX	-0.3003	-0.3699	0.0696	-0.0041	0.0737	1
NIFTY	-0.3393	-0.3699	0.0306	-0.0030	0.0336	3
Pandemic Period						
GREENEX	0.9279	0.7721	0.1558	0.0521	0.1037	1
ESG	0.9179	0.8751	0.0428	0.0114	0.0314	2
SENSEX	0.7987	0.8883	-0.0896	0.0224	-0.1120	4
NIFTY	0.8296	0.8813	-0.0517	0.0124	-0.0641	3
Post-Pandemic Period						
GREENEX	0.1139	0.0414	0.0725	0.0134	0.0590	1
ESG	0.0661	0.0491	0.0170	0.0008	0.0162	3
SENSEX	0.0716	0.0495	0.0221	0.0021	0.0199	2
NIFTY	0.0621	0.0494	0.0127	0.0013	0.0114	4

Table 11 displays the results of Fama's Decomposition Measure in various periods. Except for the pre-pandemic period, GREENEX and ESG Index generated higher risk premiums in comparison to SENSEX and NIFTY. It must be noted that because of higher systematic risk, SENSEX and NIFTY provided higher compensation for non-diversification to the investors as compared to GREENEX and ESG Index. Similarly, because of fewer diversification benefits in GREENEX Index, it provided higher compensation for unsystematic risk in all the periods as against other indices. However, the interesting point to note here is that both GREENEX and ESG Index provided positive net selectivity returns in all the periods (especially during the pandemic). Thus, environmentally responsible companies outperformed blue chip companies even on net selectivity. This indicates that compromise with respect to diversification made by investors by investing in environmentally responsible companies was well rewarded in terms of higher returns. Thus, it proves that GREENEX and ESG Index can be used to build up defensive and better-performing indices by investors in India.

Conclusion

This paper examined the issue of whether the index of green and socially responsible companies are being well rewarded in terms of better price discovery, higher returns and risk-adjusted coefficients. Price discovery was analysed using a semi-log regression model or growth equation. In line with Bhanumurthy et al. (2014) and Tripathi and Bhandari (2012 & 2015), it is found that the impact of the COVID'19 pandemic was positive and significant for green and socially responsible companies. The growth rate of GREENEX and ESG Index was significant and higher than that of SENSEX and NIFTY in all the periods. Moreover, the growth rates were significantly different from each other in different periods taken. GREENEX and ESG Index generated higher returns than SENSEX and NIFTY during all the periods, but the difference is significant during the pandemic period only. Also, GREENEX and ESG Index outperformed SENSEX and NIFTY in terms of various risk-adjusted techniques used in the paper.

Our findings support the view that investing in green and socially responsible companies does not hurt investors in various periods, especially during adverse times. These companies or indices can be used to build up defensive investment by investors in India, and hence, with our analysis, it is proved as a boon for Indian investors. Our findings have important implications for banks, mutual fund or portfolio managers, policymakers and investors. Banks and mutual funds should start providing their clients with environmentally friendly or socially conscious products like Green Fixed Deposit Options, Clean Technology Ventures, Green Government Bonds, etc. The regulators and policymakers should make sure that sufficient and scarce resources are provided to environmentally friendly and socially conscious businesses for the most effective use of resources with the least amount of environmental impact. This helps in ensuring that the solutions offered are not wasted. The idea of "Green Banks" should be developed by the government with the intention of fostering the expansion of the clean energy industry while lowering consumer energy costs, improving consumer health, fostering employment growth, and conserving public funds. Since the securities of green and socially responsible companies are performing well during the pandemic period, there is a distinct possibility that investors to put more faith in these companies.

However, the study is not free from certain limitations. First, use of other sophisticated risk-adjusted techniques could have been employed to evaluate the performance. Second, an international comparison can also be made by taking socially responsible indices from international markets.

References

Al-Awadhi, A., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioural and Experimental Finance, 27*. doi:https://doi.org/10.1016/j.jbef.2020.100326

Alber, N., Abdelrhim, M., Elsayed, A., Farouh, M., & Mohamed, M. (2020). The effects of COVID-19 spread on oil markets: The case of the top 10 producing countries. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3882083

Bhanumurthy, K. V., Bhandari, V., & Pandey, V. (2014). Does the Indian stock market encourage socially responsible companies? *Manthan Journal of Commerce and Management*, *1*(1), 1-34.

Chowdhry, E. K., Khan, I., & Dhar, B. (2021). Catastrophic impact of COVID-19 on the global stock markets and economic activities. *Business and Society Review*, *127*(2), 437-460.

Contessi, S., & De Pace, P. (2020). The international spread of COVID-19 stock market collapses. *Finance Research Letters*, *42*. doi:https://doi.org/10.1016/j.frl.2020.101894

Elsayed, A., & Abdelrhim, M. (2020). The effect of COVID-19 spread on Egyptian stock market sectors. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3608734

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, *25*(2), 383-417.

Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. IESE Business School Working Paper No. WP-1240-E. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3557504

Hatmanu, M., & Cautisanu, C. (2021). The impact of COVID-19 pandemic on stock market: Evidence from Romania. *International Journal of Environmental Research and Public Health*, *18*(17), 9315.

Kartal, M., Depren, S., & Depren, O. (2020). How main stock exchange indices react to COVID-19 pandem-

ic: Daily evidence from East Asian countries. *Global Economic Review*, *50*(1), 54-71. doi:https://doi.org/10.1080/1226508X.2020.1869055

Ozili, P. K., & Arun, T. (2020). Spillover of COVID-19: Impact on the global economy. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3562570

Tripathi, V., & Bhandari, V. (2012). Green is good in Indian stock market. *Colombo Business Journal*, *3*(2), 27-45.

Tripathi, V., & Bhandari, V. (2014). Socially responsible investing - An emerging concept in investment management. *FIIB Business Review*, *3*(4), 16-30.

Tripathi, V., & Bhandari, V. (2015a). Performance of socially responsible portfolios: Do economic conditions matter? *Journal of Commerce and Accounting Research*, *4*(1), 14-30.

Tripathi, V., & Bhandari, V. (2015b). Catalyzing social responsibility in companies by Indian stock market. *FIIB Business Review*, *4*(1), 3-13.

Zoungrana, T. D., Toe, D., & Toe, M. (2021). COVID-19 outbreak and stocks return on the West African economic and monetary union's stock market: An empirical analysis of the relationship through the event study approach. *International Journal of Finance and Economics*. doi:https://doi.org/10.1002/ijfe.2484